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ABSTRACT

A British publisher conducted a readability study of its English language content area texts being used in foreign countries to determine how the texts could be made more readable. A cloze procedure assessment of a secondary school Hong Kong social studies series indicated that the English texts were too difficult for 91% of the pupils tested. Teachers were also asked to group their pupils into those who understood the text and those who did not to determine whether the teachers' assessment correlated with the cloze results. They, too, predicted that the texts were too difficult for most of the students tested. A multiple choice test of vocabulary revealed the several kinds of vocabulary posed problems of readability, including idiomatic expressions, "imported" vocabulary, and unfamiliar words lacking context support. Based on these results, the entire secondary level social studies series was rewritten. Among the changes made were three-column pages with ragged right margins, artwork located at the appropriate site in the text, unfamiliar words translated into Chinese, and simplification of other vocabulary. A summary of main points was placed at the end of each chapter, and an English/Chinese minidictionary was included at the end of the books. A manual of "readable writing" was subsequently developed, intended for authors and editors of educational textbooks. (HTH)

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A PUBLISHER'S ATTEMPTS TO MAKE ITS CONTENT-FIELD TEXTBOOKS MORE READABLE: A CASE STUDY IN SOCIAL STUDIES

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Background

In many former British colonies, English is the official medium of instruction at secondary level. Such countries include Singapore, Malaysia, Hong Kong; Malawi, Zimbabwe, Zambia, Tanzania, Uganda, Kenya; Ghana, Sierra Leone; and the West Indies. The same picture is also true, with certain local variants, of former American colonies such as Liberia and the Philippines. Moreover, in many of these countries, certain key subjects such as science, social studies and mathematics are taught in English from mid-primary level. And even in countries without a British or American colonial past, there are certain English-medium schools for local pupils in which English is used as the medium of instruction. Such situations exist in Greece, Egypt, Argentina, Brazil, Chile, etc. It follows that educational textbooks in all such situations are also written in English.

The problem is particularly acute when the pupil changes over from primary to secondary school, since he now faces certain new, often bewildering subjects, in a foreign language, in a much more book-based learning environment. It is no exaggeration to say, then, that in many L_2 situations a pupil's chance of academic success will depend in large measure on the extent to which he can read his textbooks.

For a number of years, Longman - in common with certain other educational publishers - have become increasingly concerned at reported readability difficulties of some of their overseas titles in fields such as science, social studies, geography, etc. There would appear to be a number of factors contributing to an increase in such concern:

1. In many overseas countries, a very swift expansion of the educational system has resulted in lower average reading-in-English standards.

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2. Writers of content-field textbooks are insufficiently aware of reading-in-English standards of the average target reader.

3. Sometimes, the content field syllabus in a subject such as Geography, History or Science is in itself unrealistic, with the result that too many extremely difficult concepts have to be taught in too short a time.

4. Publishers often have great difficulty in finding authors who have:

   4.1 command of the subject;
   4.2 classroom teaching experience at the relevant level and in the relevant country;
   4.3 awareness of the reading-in-English standards of the target pupil;
   4.4 a sufficiently high command of English;
   4.5 sensitivity to the principles of writing readable English; and
   4.6 the time and temperament to devote to the arduous task of authorship.

5. Publishers are only slowly becoming aware of the problem of readability. Moreover, improving readability costs money; and tight publication schedules sometimes deter publishers from facing up to the task.

6. For far too long, academics concerned with readability have devoted their energies to assessing readability levels of books after publication, to devising yet more readability formulae, and to comparing one formula with another. Insufficient attention has therefore been paid to pre-publication aspects of readibility, i.e. to investigating the factors that contribute to mal-readability, and the ways in which a manuscript can be made more readable before it is published as a book.

Faced with this situation, Longman therefore decided to investigate the reported readability problems of certain of their overseas titles, by means of a Readability Pilot Study (RPS) - which I was asked to direct. Longman have since used the results of RPS - plus further investigations - to improve readability standards in their content field textbooks. This paper explores the three stages to date:

1. The procedure and conclusions of RPS.

2. The rewriting/redesigning of a textbook series based on RPS principles.

3. The training of editors in the principles of readable writing, by means of a purpose-written manual, and associated seminars.

STAGE ONE: THE READABILITY PILOT STUDY

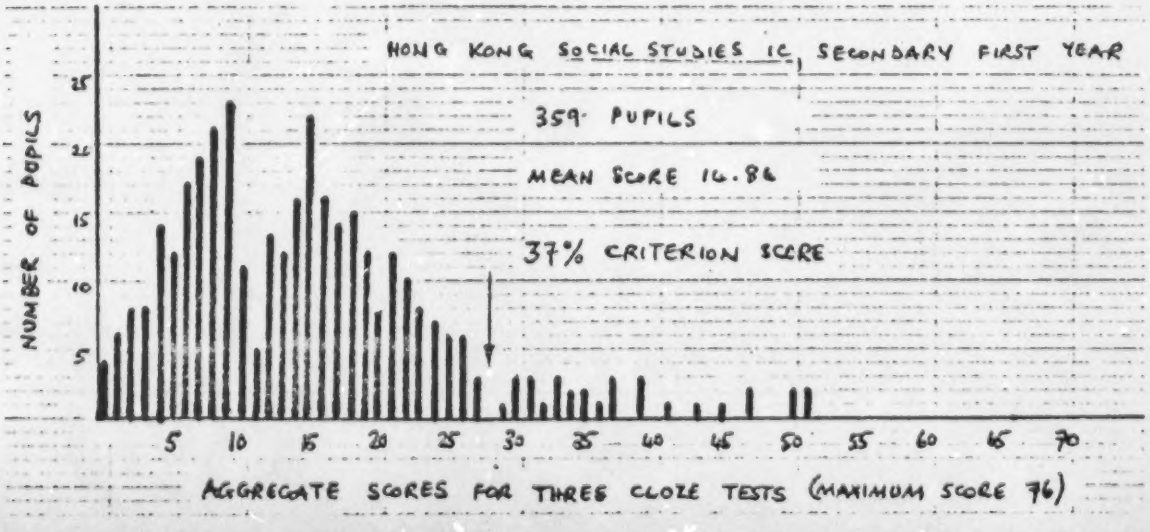
The objectives of RPS were:

1. to assess the readability of certain titles;
2. to identify the major causes of their mal-readability; and
3. to search for a "desk-top" readability formula that would be fast, reasonably accurate, and would be diagnostic in nature.

Readability research was carried out in Hong Kong and Northern Nigeria. This paper is concerned with Hong Kong, where the title chosen for attention was Living Hong Kong Social Studies 1C (1976). This is one of a nine pupil-book series, with three books being used in each of the first three secondary years. In addition, there are nine workbooks and nine teacher's books.

Cloze Procedure

I decided to assess the overall readability levels of Social Studies 1C by means of cloze procedure. Stokes (1978) reminds us that there is considerable variation of readability levels within one book. Therefore a preliminary stage was to make sure that the passages to be used for cloze procedure were representative of the readability level of the book as a whole. Eight extracts (averaging 264 words) from various parts of the book were analysed by means of Botel and Granowsky's (1974) Syntactic Complexity Formula. Three of these passages that were representative of the book's overall readability level were chosen for cloze purposes. Deletions were 1-in-7, with a total of 76 blanks, and the tests were given to 359 Secondary 1 pupils in nine Hong Kong schools. Results were as follows:



Using Cripwell's (1976) criterion level of 37%, the cloze results indicated that Social Studies 1C was too difficult for 91.4% of the pupils tested. These results are disturbing.

Teachers' Assessment of Text Difficulty

In the Schools Council The Effective Use of Reading project, Harrison (1979) reports research in which groups of teachers were asked to write down the age at which they felt the average child could read and understand two texts - one from an auto-biographical novel, and the other from a Biology textbook. Teachers' pooled scores were then compared with reading levels derived from the Flesch formula. Results were:

(a) The pooled scores of groups of teachers were extremely close.

(b) The average teacher's scores for each passage were remarkably close to the reading levels derived from Flesch.

As part of the RPS cloze testing in Hong Kong, I did a similar piece of research, to see whether teachers' assessments might have a contribution to make as to the readability of a text. Before returning the completed cloze tests, each teacher was asked to rank their pupils in the order in which the teacher felt pupils understood the book as a whole, starting with the pupil considered to understand the book best. The teacher was then asked to draw a horizontal line through the list of pupils; those above the line were those who the teacher felt understood the book to his/her satisfaction.

The objective was to correlate teachers' pooled assessments with cloze results. If a high correlation resulted, it would be reasonable to assume that teachers' views on the readability of a book would be well worth taking into account. In calculating the results, I took the three pupils immediately above the line on each class list (i.e. the three pupils that teachers felt could just understand the book to the teacher's satisfaction). I then averaged the cloze scores of each set of three pupils, to give a "teacher's minimal assessment". Results were as follows:

School	A	B	C	D	E	F	G	H	I
Teacher's Minimal Assessment	10	17.8	8	20.3	18.6	20	5.6	5	18.3
Mean = 13.73 (=18.07%) SD = 6.08									

Teachers' pooled judgements therefore indicate that they are satisfied with a pupil who scores 13.73 on the aggregate 76-item cloze tests. This converts to 18.07%, compared with the 37% criterion level used in the cloze tests to assess whether or not a text is too difficult. On this evidence, we must therefore conclude that teachers' pooled judgements are likely to make little contribution to the assessment of readability in the L2 situation, not only because of the poor correlation between their mean of 18.07% and the cloze criterion level of 37%, but also because of the variance (SD = 6.08) between individual teachers' minimal assessments. A number of factors probably contributed to these results, including:

(a) Secondary 1 teachers in Hong Kong are often newly-trained and relatively inexperienced, therefore it is perhaps unfair to ask them to make such a judgement.

(b) Teachers possibly interpreted the request as in some form reflecting their own competence as teachers. This may have distorted their assessments.

(c) Assessment of minimally-acceptable reading standards is a complex task, (particularly in the L2), calling for considerable sensitivity to readability matters.

(d) The teachers concerned were teachers of Social Studies, not English.

Nonetheless, although teachers' pooled judgements are unlikely (on this evidence) to be able to contribute to readability assessment, they did contribute to our assessment of the RPS cloze results. It will be remembered that at the 37% criterion level, the cloze test results indicated that Social Studies 1C was too difficult for 91.4% of the pupils tested. Even with the teachers' pooled judgements of 18.07% as a criterion score - and bearing in mind caveats (a) - (d) above - the teachers themselves considered the book too difficult for 71.31% of the pupils tested.

Factors Contributing to Mal-readability of Social Studies 1C

Vocabulary

A 40-item multiple-choice test of vocabulary was given to 259 pupils in nine schools, using categories of vocabulary felt to represent problems from Social Studies 1C. The test revealed that the following types of vocabulary posed problems of readability:

Idiomatic Expressions, eg. working off steam, waking up with a start

The reason is most probably that the L2 Chinese pupil attacks an idiomatic expression word-by-word, e.g. work = what mother and father do every day; off = opposite to on; steam = what comes out of a kettle. But adding together these

individual parts results in the pupil being unable to form any meaningful interpretation of the expression as a whole. Unfortunately, the problem is rarely restricted to that of the pupil not making sense of the idiomatic expression alone. This is because such expressions encapsulate the essence of a concept in "short-hand" form, and thus are central to understanding wider areas of meaning.

Vocabulary Contained in "Imported" Text

A book such as Social Studies 1C, covering a wide range of topics, has clearly and necessarily made use of a wide range of source material. For the most part, that source material has been rewritten to meet the reading-in-English level of the pupils. But there are instances of original text imported from newspapers, written for the adult reader, containing words such as unique, initiated, sponsor, complimented. On the multiple-choice test, such "imported" words scored low percentages of correct responses.

But such "visible-imported" vocabulary only serves to highlight a wider, "buried" matter concerning vocabulary control. All textbooks rely on a wide range of original source material - other books, government reports, official documents, newspapers, magazines, etc. The readership of these source materials is almost always different from the target readership of an educational textbook; and so the author naturally simplifies the content and overall language in terms of the target pupil readership. But sometimes the author becomes so accustomed to the vocabulary of the original, that that vocabulary is presented in the textbook without regard to its comprehension by the pupil. An example of such "buried imported" vocabulary in Social Studies 1C is where the source material was presumably a Fire Services Department leaflet covering DOs and DON'Ts for various fires. Words such as lighted, inflammable, extinguished, confine, overcome, alerted and smothering have probably been taken from the original leaflet, but are at too high a level of difficulty for the Secondary 1 Hong Kong pupil.

Context Support

The multiple-choice test showed that words with context support, e.g.

Keep (inflammable) goods well away from a lighted stove.

were easier to understand than words without context support, e.g.

We can alter our personalities to some extent when we grow older, but it may not be easy.

Vocabulary Contained in Glosses

Each Unit of Social Studies 1C ended with a "Words to Learn" section, containing a list of English words, gloss, and Chinese translations of the words, e.g.

a drug = a substance which has a certain effect
毒品 on the body or mind. If abused, drugs can cause damage or even death.

ethyl alcohol = the base of common alcohol
乙醇 found in alcoholic drinks.

excise duty = a Government tax on certain
國內消費稅 goods sold within a country.

The multiple-choice vocabulary test showed that the vocabulary of the glosses themselves frequently caused the pupil problems, viz.

- the glosses contained too many abstract words, so that it was difficult to form a mental image of the word being glossed, e.g.

  a system = an organized set of connected parts

- glosses were given solely in words

- examples were rarely given

- glosses frequently contained words that were more difficult to understand than the word being glossed, e.g.

  a fuse = a safety device in an electrical circuit. It breaks or melts if the circuit is overloaded, reducing the fire danger.

Homonyms

The vocabulary test indicated that pupils had problems with homonyms, e.g.

If there is a fire hazard, e.g. if the staircases are blocked (? as in Taiwan Estate, Block 6) with goods (? opposite of bad), the owners must put the matter right (? as in right-hand).

Unfamiliarity

And there were, of course, numerous examples of vocabulary that was unfamiliar to the Chinese Secondary 1 pupil, e.g. insecure, irritable, identical.

Syntax

A particular problem was surface structures with alternative interpretations, an example being the X or Y structure, e.g.

> If your eyes become sore or if you often get a headache when you study, you may be suffering from eye-strain and you should see an oculist or eye-doctor.

Here, the function of the X or Y structure is to explain the meaning of oculist by means of the better-known eye-doctor. Unfortunately, the X or Y structure has been taught to pupils in English lessons as meaning "alternative to", as in:

> Tomorrow I shall go to the cinema or a football match.

As part of RPS, pupils were presented with twelve extracts from RPS containing the X or Y structure - seven "explanatory" and five "alternative". Pupils were asked to assess whether X and Y were "same" or "different". The result (n = 261) was a mean pupil score of 6.03 for the twelve extracts. This showed the pupils to be thoroughly confused by the use of a surface structure carrying two quite different interpretations.

Other examples of surface structures carrying two possible interpretations were:

> The tribe ... might conquer neighbouring tribes (✓sometimes conquered/ possibly conquered).
>
> The tribe would settle in a good farming area. (✓used to settle/settled if ...)

Cohesion

Tests showed that extracts rewritten with cohesion strengthened were more readable than the original extracts. Particularly important was the addition of discourse markers to make inter-sentence of inter-clause relationships more overt, e.g.

> ... man likes to live among other people - in other words, man is sociable.
>
> Early men enjoyed each other's company. For example, in the long nights, the tribe sang songs and danced.

Also, comprehension improved when ambiguous anaphoric reference was replaced, e.g.

> A community is a group of people living in the same area and sharing a similar way of life. ~~It~~ The community may be a small number of people living in a village ...

Ed: point clearer

Coherence

Tests showed that comprehension improved significantly if the coherence of a passage was strengthened, e.g.

ORIGINAL	REWRITTEN
Some female animals bring up their young without the help of the male. One example is the bear. The male bear will kill its young if it finds them. A few months after birth, the young bears are strong enough to go off on their own. The female then looks for another male. After mating, the female leaves the male. So bears do not have any family life.	Some female animals bring up their young without the help of the male. One example is the bear. After mating, the female bear leaves the male bear, because the male will kill its young if it finds them. A few months after birth, the young bears are strong enough to go off on their own. The female then looks for another male. So bears do not have any family life.

Artwork Improvement

This was not tested; but it was quite clear from an examination of Social Studies 1C that artwork could have a greater impact on readability if the following improvements were made:

- more educative, less cosmetic artwork
- greater integration between artwork and text
- more annotation to artwork
- artwork sited next to its text reference

Finally, with regard to objective 3 of RPS, we have not yet found the "holy grail" - a desk-top readability formula.

STAGE 2: REVISION OF THE LIVING HONG KONG SOCIAL STUDIES SERIES

Shortly after the presentation of the findings of RPS, Longman - with the support of the authors - commissioned a team to rewrite and redesign the Hong Kong Social Studies Series. The team comprised members of the Longman Research and Development Unit and myself. The decision to produce the new edition was taken in the normal course of the periodic updating of all successful textbooks.

Over a twelve-month period, all nine pupils' books, nine workbooks and nine teacher's books were rewritten. The rewriting was done on a column-by-column grid, 36 characters maximum/line, 30 lines maximum/page. This was a very time-consuming business: rewriting the pupil's book, for example, took an average of an hour per page. The following "before and after" pages illustrate some of the major changes made.

"BEFORE"

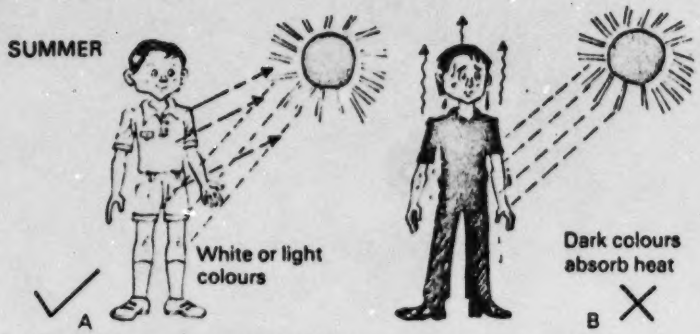
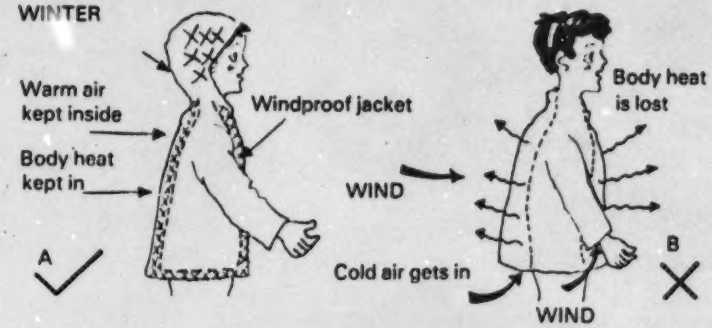


Fig. 2 Summer and winter clothing

During the hot summer months you wear thin clothing. Light-weight clothing is better in summer. It allows air to pass through it. And light colours are cooler than dark colours. The sun's rays are reflected from or bounce off light-coloured material. Dark colours absorb the heat of the sun's rays.

In the cold winter months, you put on thicker clothes. Closely-woven and thicker materials help keep the body warm. A *windproof* jacket can keep you much warmer than a thick but open-textured one.

Summer clothing



As well as helping to keep you warm or cool, your choice of clothing depends on other things. Your choice will be affected by whether it is wet or dry. If it looks as though it may rain, you may decide to carry a waterproof coat or an umbrella. It will also be affected by where you are going and what you plan to do there. If you are going for an *interview* for a job, you should wear smart and neat clothes.

Always try to look as smart and clean as possible. It is all part of the 'well-groomed' appearance we talked about earlier.

Winter clothing

"AFTER"

Clothes in different seasons of the year

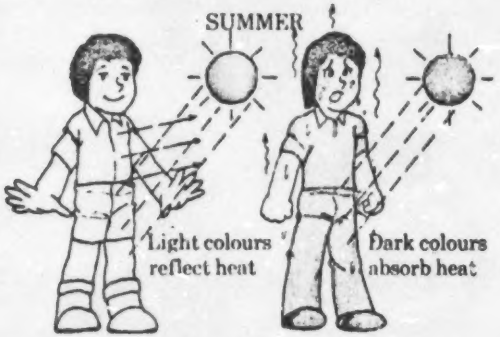


Figure 15 Summer clothing

During the hot summer months, people wear thin clothing. Light-weight clothes are better in summer because they let air pass through them. This helps to keep your body cool. Also, light colours are better than dark colours. This is because the sun's rays are reflected (反射) from light-coloured material. But dark colours take in the heat of the sun's rays.

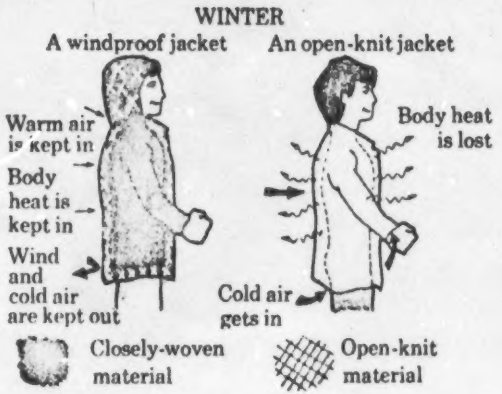
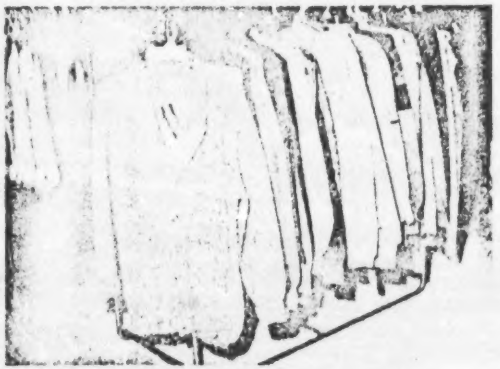


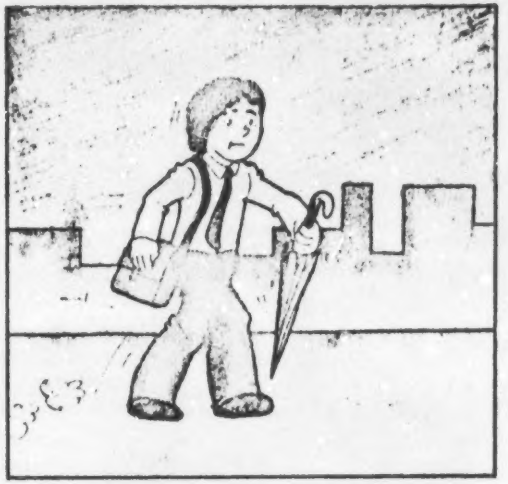
Figure 16 Winter clothing

In the cold winter months, people wear thicker clothes. Closely-woven and thicker materials help to keep your body warm. A windproof (防風) jacket can keep you much warmer than a thick but open-knit one.



Open-knit jackets for sale in a shop

Your choice of clothes depends on whether it is hot or cold. Your choice also depends on whether it is wet or dry. For example, if it looks as though it may rain, you will probably take a raincoat or an umbrella.



Your choice of clothes may also depend on where you are going, and what you plan to do there. For example, if you are going for an interview (會見) for a job, you should wear smart and neat clothes.

Design and Artwork Revision

- The revised edition is set out three columns per page for improved readability, with an unjustified right-hand margin.
- Serif type-face is used for greater legibility.
- Section headings now appear only at the top of columns, so as to improve text information structure.

  (These improvements were made on the advice of the Typography and Graphic Design Department, University of Reading.)

- Artwork is redrawn, and is physically sited with the appropriate section of the text
- Artwork annotation is strengthened in order to enhance comprehension of text content. In particular, more use is made of simple, full-sentence annotation.

Text Revision

- Unfamiliar words on first occurrence are followed by bracketed Chinese translations.
- Other unfamiliar words are explained via artwork.
- Cohesion is improved, e.g.

(lexical reiteration)	clothing ... clothes
(conjunction)	because/Also/This is because/But/also/ For example
(reference)	Lightweight clothes are better in summer because they let air pass through them. This helps to keep your body cool.
(ambiguous reference)	It ⟶ Your choice of clothes ...

- Syntax is simplified, e.g.

(passive ⟶ active)	Your choice will be affected ... ⟶ Your choice also depends ...

- Redundant content is removed, e.g.

  As well as helping to keep you warm or cool, your choice of clothing depends on other things → Your choice of clothes depends on whether it is hot or cold.

- Vocabulary is simplified, e.g.

  waterproof coat ⟶ raincoat

to the Series as a whole

Improvements/not shown on these "before and after" pages include:

- "Things to Do" activities from the old edition are made more active, renamed "Learning by Doing", and are placed at the end of the unit or section to which they refer. Those activities now frequently resemble those common in teaching English as a Foreign Language, e.g. gap-filling, matching, information transfer, annotated collages, etc.

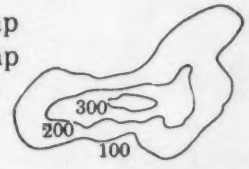
- There is now a summary of main points at the end of each unit, to help reinforce the material covered. These main points are frequently followed by a discussion-prompting question, e.g.

  - The skeleton is a system of bones to keep the body in its proper shape. (What would happen if your body did not have a skeleton?)
  - The body's system of muscles makes the bones move, and helps to keep the body upright.
  - Personal hygiene means a system of rules for healthy living. These rules are about looking after your body and keeping it clean.
  - The skin should be washed at least once a day. (Which parts of the skin need special attention?)

- There is an end-book English-Chinese mini-dictionary, for the pupil to refer to when meeting an unfamiliar word on second or subsequent occurrence.

- New words are defined, exemplified in context, and practised in the corresponding section of the workbook. These new words are defined in the most suitable manner, to enhance comprehension, e.g.

contour line — Contour lines join up places on a map that are the same height. On this map there are three *contour lines*.



cross-section — A cross-section is a surface made by cutting across something. Cut an apple in half, then draw one of the flat sides. You will draw a *cross-section*.

- White space is used more liberally.

The Department of Education, Hong Kong Government has taken an active interest in the readability improvements made in the Social Studies case-study. The Department is now designing independent tests, in order to find out the extent of the readability improvements, and so make them more widely applicable.

STAGE THREE: A MANUAL OF READABLE WRITING FOR AUTHORS AND EDITORS OF EDUCATIONAL TEXTBOOKS

Arising from the experience we gained both in RPS and in the rewriting/redesigning of the Living Hong Kong Social Studies series, I was asked to prepare a manual of readable writing. Its objective is to give practical, easy-to-read advice as to the major principles involved. The manual therefore contains numerous examples of the various facets of mal-readability, and includes many rewriting exercises. It will be used as part of the training programme for newly-appointed editors, particularly on readability seminars. It will also be used with newly-commissioned authors - either the whole manual, or relevant sections according to such needs as are disclosed in early chapters of an author's manuscript.

The manual starts with an overview of the reading process, based on a psycholinguistic model which views reading as a process of reconstructing the writer's original message. Such a model also stresses the essentially interactive nature of reading, in which a reader conducts a mental dialogue with the absent writer - predicting, forming and testing hypotheses, confirming, rejecting, suspending belief, clarifying, etc. This overview of the reading process also briefly describes the relationship between the eye and the brain. I feel that such a description - and the major obstacles to reading at both the author's and reader's ends of the process - is important for the author or editor to understand. The reasons are twofold. First, such an understanding helps the author or editor to write "through the eyes of the reader". And second, it acts as a theoretical framework on which I can hang the body of the manual, in describing the problems caused to the reader by features such as an incoherent paragraph, absent cohesion, or an independent clause occurring too late in a complex sentence.

The body of the manual is based on a "levels" approach. In other words, sections in turn describe the readability problems inherent in throughtless vocabulary choice, inadequate explanation of newly-introduced words or specialist terminology, overlong/overcomplex sentences, weak cohesion, faulty coherence, and misleading punctuation. The approach throughout these sections is principle + examples + rewriting exercises. The latter are particularly important, since I firmly believe that an author or editor will only master the skills of readable writing through practice. Also, I

emphasize throughout the manual the cumulative effect of such facets of mal-readability.

CONCLUSION

Stages 1 and 2 of this paper describe a case-study in relation to a textbook written for an L_2 situation. But content field readability is equally a problem in the L_1 context, and the manual is certainly written with both types of readership in mind. In fact, there has been increasing attention in recent years to the content field readability problems of the native English-speaking reader. And this concern can only increase if CSE and GCE merge, with the consequence of a single textbook being used by pupils from a wide range of reading levels.

In the content-field textbook sense, I see reading and writing as opposite sides of the same coin. And I see part of the responsibility of reading professionals and academics as being concerned with ways of contributing to the pre-publication readability of content-field textbooks, in addition to assessing their post-publication readability and to helping students read such textbooks. In other words, if a fraction of the research effort, time and money currently spent - directly or indirectly - on teaching pupils to read content-field textbooks were to be diverted to helping authors to write more readable textbooks, then many of the pupil's problems would be eased.

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